

## CRYOFLEX<sup>Æ</sup> Cryo Pipe

CRYOFLEX<sup>Æ</sup> transfer pipes of type FGL are vacuum insulated, bendable piping systems with two or more concentrically arranged corrugated pipes.

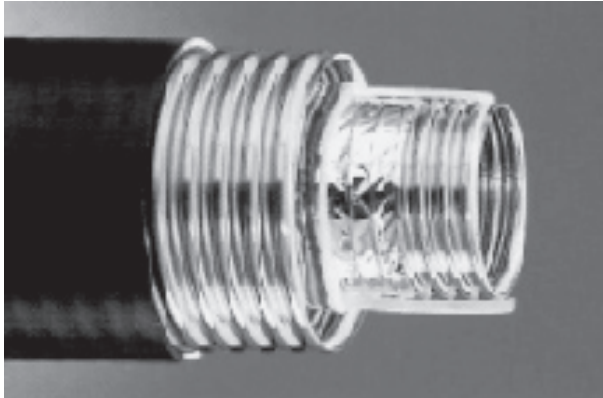
The pipes are equipped with end caps, leak-tested and evacuated at the factory. The assembly on the construction site is easy and cost-effective.

CRYOFLEX<sup>Æ</sup> transfer pipes are fully made of special steel, are ready, leak-tested and evacuated at our factory. All seams are TIG welded, the superinsulation is annealed. The insulating vacuum is preserved for many years through built-in adsorber elements. Consequently, a permanent re-evacuation is not needed.

Pipe ends are designed as low-loss welded or plug-in couplings. Bends are not necessary owing to the flexibility of the pipe. Similarly, minor changes in the connection locations or the piping course is compensated with the pipe.

### Construction

Construction of a two-piece concentric standard



1. Helical corrugated special steel primary pipe, longitudinal seam-welded
2. n positions Superinsulation (Al-insulated PET-Film on both sides) with spacer fleece made of PP between the individual positions
3. low loss spacer
4. helical corrugated special steel outer containment pipe
5. vacuum space
6. outer PE protective jacket

### Material

Corrugated pipe:

Use of special steel of quality 1.4301 with reduced carbon content of less than 0.05% or special steel of quality 1.4404, 1.4571 or 1.4306

Coating:

Protective jacket made of PE superinsulation: Polyester film coated aluminium is used on both sides. Between these films, polypropylene fleece acts as separation layer.

Spacer:

Spacers centre the primary pipe in the outer containment pipe and prevent direct contact of the pipes between each other. They are so designed that only less thermal conduction is possible at maximum mechanical load.

Getter:

Molecular sieve and chemical getters ensure long-term vacuum.

High quality corrosion proofing:

The continuous, outer multilayer corrosion proofing provides incomparable safety in the ground while laying and working with pipes.

## CRYOFLEX® Transfer Pipe

Economic efficiency of vacuum insulated pipes

There are losses when storing and transporting liquid nitrogen, so that a part of the liquid nitrogen can't be used for the actual process. The pipe quality has a perceptible influence on it. As compared to a simple, conventional insulated pipe, a vacuum insulated pipe saves so much in a year under certain circumstances that the investment is compensated.

Low temperature is needed in various regions. It can pertain to the simplest systems for liquid nitrogen or a completely complicated one for liquid helium. In both cases, transfer pipes play a very significant role. Depending on the application, the requirements of piping systems vary, e.g. with regard to pressu-

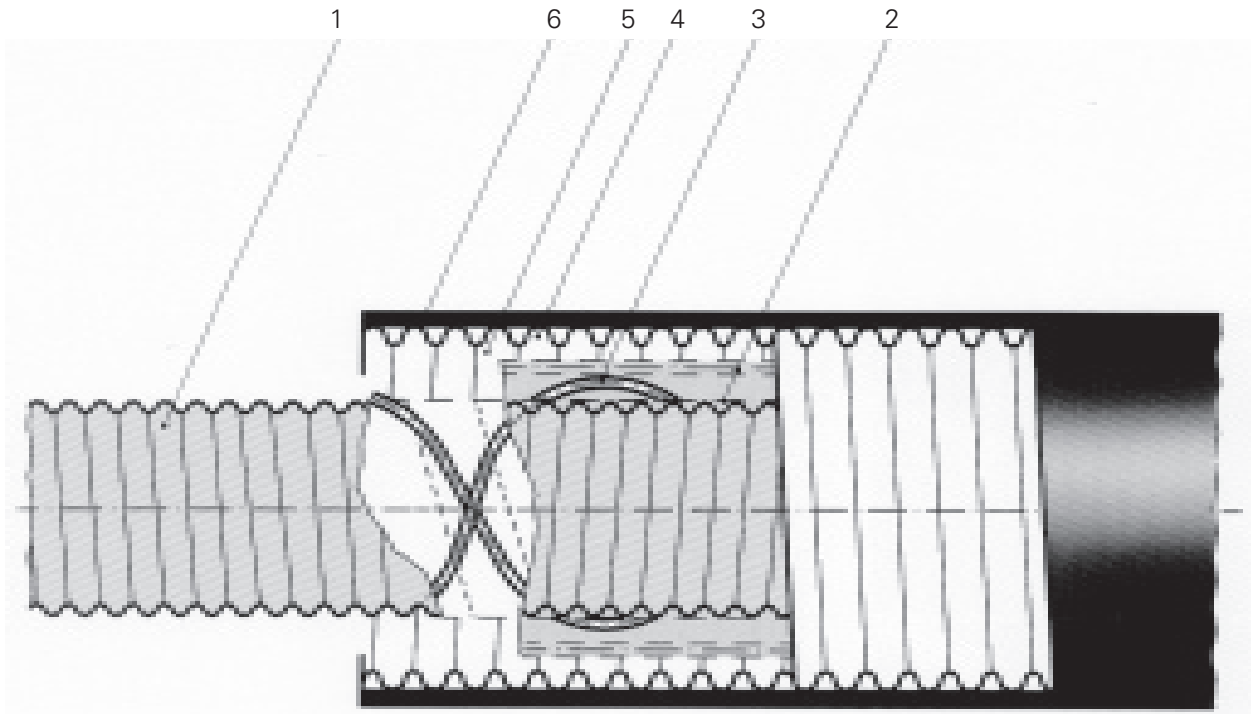
re, insulation against heat and pressure loss. So, one must always choose or design the suitable system depending on the application.

As part of our consultation services, we are ready to suggest a suitable solution for our customers, or to develop a special solution together with the customer. Here we can rely on more than 20 years of experience.

In addition to transfer pipes, we have a range of system components. We integrated external components in our systems in individual cases.

A consistent quality policy is the basis for 20 years of successful work.

In many cases, final tests are conducted in the presence of the customer or together with a neutral test institute, e.g. TÜV.



1. Corrugated special steel primary pipe, according to EN 10088:  
1.4301 (AISI 304) or 1.4571 (AISI 316Ti) or 1.4404 (AISI 316L)
2. n positions Superinsulation (Al-insulated PET-Film on both sides) with  
Spacer fleece made of PP between the individual positions
3. Low-loss spacer
4. Corrugated special steel outer containment pipe, according to EN 10088:  
1.4301 (AISI 304) or 1.4571 (AISI 316Ti) or 1.4404 (AISI 316L)
5. Vacuum space
6. Outer jacket made of polyethylene (PE)

**Table 1: CRYOFLEX® Transfer Pipe - Standard types**

FLG-Type		14/34	21/44	30/58	39/66	60/110	81/143	100/163
Inner diameter	[mm]	14/18	21/25	30/34	39/44	60/66	81/91	100/110
Outer diameter	[mm]	30/34	39/44	51/58	60/66	100/110	130/143	147/163
Bending radius								
More bends	[mm]	600	700	900	1100	1200	1400	1500
One-time bends	[mm]	300	350	450	550	600	700	750
Heat incidence	[W/m]	0.5	0.8	1.2	1.5	1.7	2.0	2.0